Retlif Testing Laboratories
3131 Detwiler Road
Harleysville, PA 19438

Certificate of Conformance
FCC Part 15, Subpart B
Industry Canada, ICES-003

Date Issued:	May, 2013
Issued to:	Z-Band, Inc. 848B N. Hanover Street Carlisle, PA 17103
Reference:	Retlif Report Number R-1985P

Retlif Testing Laboratories hereby acknowledges that compliance testing in accordance with the below listed standards was performed on a representative sample of the equipment listed below. Retlif Testing Laboratories further acknowledges that the test sample listed below was found to be in compliance with these standards.
This certificate is hereby issued to the above-named grantee and is valid only for the equipment identified below:

Manufacturer:	Z-Band, Inc. 848B N. Hanover Street Carlisle, PA 17103
Equipment Tested:	Broadband Video Distribution System
Part/Model Number:	ZF-2400
Serial Number:	40099
Brand Name:	Giga BUD
Equipment Type:	Digital Device
Equipment Class:	A
Authorization:	Verification

Notes: 1) See attached report R-1985P for details and/or conditions pertaining to this certificate.
2) Conforms to the requirements of:

FCC:

Para. 15.107(b) for Conducted Emissions, 150 kHz to 30 MHz
Para. 15.109(b) for Radiated Emissions, 30 MHz to 1 GHz

IC:

Section 6.1, Conducted Emissions, 150 kHz to 30 MHz
Section 6.2, Radiated Emissions, 30 MHz to 1 GHz

Retlif Testing Laboratories

3131 Detwiler Road, Harleysville, PA 19438
215-256-4133 - Fax: 215-256-4130

CORPORATE OFFICE
795 Marconi Avenue
Ronkonkoma, NY 11779
631-737-1500 Fax 631-737-1497
(A NY Corporation)

BRANCH LABORATORIES
101 New Boston Road
Goffstown, NH 03045
603-497-4600 Fax 603-497-5281

WASHINGTON
REGULATORY OFFICE
703-533-1614 Fax 703-533-1612

MEMBER ACIL

FCC/IC Verification Test Report

On

Broadband Video Distribution System
Part/Model Number: ZF-2400
Serial Number: 40099

Customer Name:	Z-Band, Inc.
Customer P.O:	1242
Date of Report:	May 23, 2013
Test Report No:	R-1985P
Test Start Date:	May 20, 2013
Test Finish Date:	May 20, 2013
Test Technician:	B. Reitz
EMC Test Engineer:	D. F. Landers
Approved By:	R. J. Reitz
Report Prepared By:	J. Docherty

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Certification and Signatures

We certify that this report is a true report of the results obtained from the tests of the equipment stated, and relates only to the equipment tested. We further certify that the measurements shown in this report were made in accordance with the procedures indicated and vouch for the qualifications of all Retlif Testing Laboratories personnel taking them.

Dean F. Landers
EMC Test Engineer

Richard J. Reitz
Corporate Laboratory Manager
iNARTE Certified Engineer ATL-0036-E
NVLAP Approved Signatory

Section 2.955 of the FCC Rules covers record retention, which requires that this test report include the name and signature of an official of the responsible party for compliance as defined in 2.909. In order to satisfy this requirement, please sign below:

Responsible Party Official (Please Print)

Signature Date

Non-Warranty Provision
The testing services have been performed, findings obtained, and reports prepared in accordance with generally accepted testing laboratory principles and practices. This warranty is in lieu of all other warranties, either express or implied.

Non-Endorsement
This test report contains only findings and results arrived at after employing the specific test procedures and standards listed herein. It is not intended to constitute a recommendation, endorsement, or certification of the product or material tested. This report must not be used by the client to claim product endorsement by NVLAP, NIST or any agency of the U.S. Government.

Revision History

Revisions to this document are listed below; the latest revised document supersedes all previous issues of this document:

Revision	Date	Pages Affected
-	May 23, 2013	Original Release

Test Program Summary

Report Number:	R-1985P
Customer:	Z-Band, Inc.
Address:	848B N. Hanover Street
	Carlisle, PA 17103
Test Sample:	Broadband Video Distribution System
Part/Model Number:	ZF-2400
Serial Number:	40099
Manufacturer:	Z-Band, Inc.

Test Specification:
Telecommunications, CFR Title 47, Part 15 Radio Frequency Devices, Subpart B, Unintentional Radiators and Industry Canada ICES-003

Test Methods:
The test methods performed on the Broadband Video Distribution System and the corresponding test results are shown in Table 1:

Table 1 - Test Methods and Results

Para. Herein	FCC Paragraph	IC Section	Test Method	Frequency Range	Test Results
6.1	15.107(b)	6.1	Conducted Emissions, Class A	150 kHz to 30 MHz	Complied
6.2	15.109(b)	6.2	Radiated Emissions, Class A	30 MHz to 1 GHz	Complied

NVLAP Lab Code 200815-0

All test methods listed above are included in Retlif Testing Laboratories Harleysville, Pennsylvania NVLAP Scope of Accreditation and were performed in accordance with the Retlif Testing Laboratory Quality System which is compliant with the requirements of ISO/IEC 17025 General Requirements for the Competence of Calibration and Testing Laboratories.

1.0 Scope

This test report documents the methods used in measuring the conducted and radiated emissions produced by a Broadband Video Distribution System (EUT), Part/Model Number: ZF-2400, Serial Number: 40099, manufactured by Z-Band, Inc. of Carlisle, PA 17103. This report further serves to fully record the details of the sample tested including all interconnecting cables and support equipment. The objective of this test report is to demonstrate compliance of the Broadband Video Distribution System to the requirements for FCC Rules and Regulation Part 15, Subpart B, and Industry Canada, ICES-003 for a Class A Digital Device.

2.0 Applicable Documents

The following documents form a part of this test report to the extent specified herein:

RCM-001; Rev H	-	Retlif Testing Laboratories Calibration Manual
RQM-001; Rev P	-	Retlif Testing Laboratories Quality Assurance Manual
ANSI/NCSL Z540.1; 94 (R2002)	-	Calibration Laboratories and Measuring and Test Equipment General Requirements
ISO/IEC 17025; 2005	-	General Requirements for the Competence of Testing and Calibration Laboratories
MIL-PRF-15733H	-	Filters, Radio Frequency Interference, General Specifications for
MIL-STD-220B	-	Insertion Loss Measurement, Method of
IEEE-Std-299; 09/15/06	-	Attenuation Measurements for Enclosures, Electromagnetic Shielding for Electronic Test Purposes
CFR, Title 47, Part 2	-	Code of Federal Regulations, Telecommunications, Part 2 Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
CFR, Title 47, Part 15	-	Code of Federal Regulations, Telecommunications, Part 15 Radio Frequency Devices
ANSI C63.4:2003	-	American National Standard, Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
CISPR 16	-	Specification for Radio Disturbance and Immunity Measuring Apparatus and Methods
ICES-003, Issue 5	-	Interference - Causing Equipment Standard

3.0 Acronyms and Definitions

The following acronyms may be used within this test report:

AC:	Alternating Current
CE:	Conducted Emissions
CFR:	Code of Federal Regulations
CISPR:	International Special Committee on Radio Interference
cm:	Centimeters
dB:	Decibel
dBµV:	Decibels Relative to One Microvolt
dBµV/m:	Decibels Relative to One Microvolt per Meter
DC:	Direct Current
EMC:	Electromagnetic Compatibility
EMI:	Electromagnetic Interference
EUT:	Equipment Under Test
FCC:	Federal Communications Commission
GHz:	Gigahertz
Hz:	Hertz
ICES:	Interference Causing Equipment Standard
ISM:	Industrial, Scientific and Medical
kHz:	Kilohertz
LISN:	Line Impedance Stabilization Network
mA:	Milliampere
m:	Meters
mm:	Millimeters
mS:	Millisecond
mΩ:	Milliohm
MHz:	Megahertz
OATS:	Open Area Test Site
RE:	Radiated Emissions
RF:	Radio Frequency
RMS:	Root Mean Square
µA:	Microampere
µF:	Microfarad
µH:	Microhenry
µV:	Microvolt
µV/m:	Microvolts per Meter
V/m:	Volts per Meter
Ω:	Ohm

4.0 General Requirements

4.1 Test Environment

All testing was performed at the Retlif Testing Laboratories Harleysville, Pennsylvania NIST/NVLAP accredited facility. All testing was performed according to each methods individual requirement. Each test method outlined herein describes the individual environment in which testing was performed. All radiated emissions testing was performed on an FCC listed open area test site (OATS).

4.1.1 Conducted Emissions

All conducted emissions testing described herein was performed on a conducting ground plane. The conducting ground plane for measuring AC power line conducted emissions consisted of a floor-earth grounded conducting surface. The conducting surface extended at least 0.5 m beyond the vertical projection (footprint) of the EUT. The ground plane was covered by insulating material 1 mm thick.

4.1.2 Radiated Emissions

4.1.2.1 Formal

Formal radiated emissions testing was performed on an OATS. The test site was covered with a conducting ground plane. The equipment under test was placed in an RF transparent enclosure, on top of an 80 cm high non-metallic table which was mounted to the flush mounted, metallic turntable. The test site met the test site attenuation requirements specified in ANSI C63.4.

4.2 Test Instrumentation

A listing of all test instrumentation utilized is contained within each applicable test method. These listings indicate the model, manufacturer, frequency range, last calibration date and calibration due date of all instrumentation utilized. All instrumentation utilized was calibrated prior to use in accordance with the procedures set forth in Retlif Testing Laboratories standard manuals RCM-001 and RQM-001 which are in accordance with the requirements of ANSI/NCSL Z-540.1.

4.2.1 Grounding of Measuring Instrument

Interference measuring instruments were physically grounded with only one connection. When an antenna was used, the measuring instrument was connected to ground with only the power ground cord (green wire).

4.2.2 Measurement Uncertainty

In accordance with ISO/IEC 17025, Retlif Testing Laboratories has produced an estimate of the uncertainty of its measurements using accepted methods of analysis, through the production and application of suitable uncertainty of measurement procedures. For emissions testing, measurement uncertainty has been calculated in order to provide a confidence level of 95% (K=2.0). The results of these calculations are shown in the table below:

Table 2 - Measurement Uncertainty

Test Method	Confidence Level	Probability Distribution	K	Expanded Uncertainty
Conducted Emissions	95 %	Normal	2.00	3.72 dB
Radiated Emissions	95 %	Normal	2.00	6.10 dB

4.3 Emissions Testing

4.3.1 Ambient Interference Levels

Ambient interference levels were at least 6 dB below the specified limit for conducted emissions. For radiated emissions, the ambient levels were verified. If the ambient was within 6 dB of the specified limit, the following procedure was performed:

1. The device was pre-screened in a shielded enclosure to determine its spectral content.
2. While measuring on an OATS, the ambient interference level was measured with the EUT powered off. This scan was compared to the scan taken with the EUT powered on. Obvious ambient emissions were omitted and all emissions found to be emanating from the EUT were maximized and measured. Any emissions that were questionable were measured using a reduced bandwidth to determine if it was an ambient or if it was an emission generated from the EUT.

4.3.2 Software

4.3.2.1 Stepped Scans

EMI Measurement Software, ES-K1 Version 1-6 SP1, manufactured by Rohde and Schwarz of Munich, Germany was utilized for conducted emissions testing.

This software directs the Rohde & Schwarz EMI Receiver sweep start and stop frequencies, step size, dwell time, bandwidths and detector functions. The software integrates antenna factors, cable losses, and amplifier factors (when applicable), and presents the resultant measurements in graphical format and includes the specified test limits. Software was validated prior to test by means of the pretest measurement system verifications.

No Software was utilized during the course of the radiated emissions testing.

4.3.3 Detector Function

For the conducted emissions testing described herein a Peak, Quasi-Peak and Average detector function was utilized as specified in CISPR 16.

For the radiated emissions testing described herein a Peak and Quasi-Peak detector function was utilized as specified in CISPR 16.

4.3.4 Measurement Frequencies

The entire frequency range for each applicable test method was scanned. All frequencies with emissions within 20 dB of the specified limit were recorded.

5.0 Description of Equipment Under Test

5.1 EUT Description

The test sample was a Broadband Video Distribution System, Part/Model Number: ZF-2400, Serial Number: 40099. It measured 48.30 cm wide by 30.60 cm deep by 8.90 cm high, and weighed 3.0 kg.

The Broadband Video Distribution System is designed to distribute the entire spectrum of RF Video (5 MHz to 860 MHz) over a TIA/EIA 568 compliant category 6 or 7 twisted pair cabling infrastructure. A TIA/EIA 568 compliant category 5e infrastructure can also be utilized for 5 MHz to 150 MHz distribution.

The Broadband Video Distribution System is rack mounted in the MDF and IDF with the port count combination necessary to address the video drops served by each specific MDF/IDF. Video is distributed throughout the facility or facilities via the “CATV IN” port of the first Broadband Video Distribution System, designed as the “master” unit.

The Broadband Video Distribution System was manufactured by Z-Band, Inc. of Carlisle, PA 17103.

The EUT contained the following firmware:

- Revision 27

5.2 Electrical Characteristics

5.2.1 Power Input

Table 3 details the electrical power requirements of all EUT components:

Table 3 - Power Input

Description	Input Voltage	Frequency	Current	Phase
EUT	120 VAC	60 Hz	<2A	Single

5.2.2 Highest Clock Frequency

The highest clock frequency generated or used by the EUT was 16 MHz.

5.3 EUT Configuration

For all test methods, the EUT was configured as shown in Figure 1 - General Test Setup.

5.3.1 Rationale for EUT Configuration

The EUT was set up in accordance with CISPR 22. The EUT was selected by the manufacturer and presented to Retlif for testing. All components and features were contained within the model which will be marketed. The cabling utilized was representative of that which would be used in actual use and/or installation.

5.3.2 Power Leads and Interconnecting Cables

All power and interconnecting cables, including cable length, routing and type were as specified in Table 4. Two (2) cable sets were used for Radiated Emissions and Conducted Emissions. All cables were of the same construction and termination, but had different lengths.

Table 4 - EUT Interconnecting Cable Configurations

Description	EUT Port	Cable Length (Meters)	Signal Description	Cable Description	Routed To
EUT	F Connector	~100 (RE) / ~ 4 (CE)	Broadband RF	Shielded / RG6 Quad	CATV IN (EUT)
EUT	(12) RJ45	~30 (RE) / ~4 (CE)	Broadband RF	Shielded / CAT 6A (10GX64) - Foiled	Balun HZ-5002-1
EUT	(12) RJ45	~30 (RE) / ~4 (CE)	Broadband RF	Shielded / CAT 6A (10GX32)	Balun HZ-5002-1

The following ports of the EUT were unpopulated during the course of this testing program:

- Quantity of 24 RJ45 Ports
- Coax ports on rear of EUT case, Terminated into 75 ohm RF terminators, 10 inbound and 8 outbound.

5.4 Modifications

No modifications were made to the EUT during the course of this testing program in order to demonstrate compliance with the specified requirements.

5.5 Mode of Operation

During the performance of all testing specified herein, the EUT was operating at a low frequency (Ch. 4, 69 MHz ± 3 MHz), an intermediate frequency (Ch. 68, 489 MHz, ± 3 MHz) and a digital Hi frequency (Ch. 134, 855 MHz, ± 3 MHz), and transmitting broadband RF through CATV IN coaxial port. The applied signal was conditioned by the Broadband Video Distribution System and distributed through 24 RJ45 ports through CAT 6A cable to HZ5002-1 Baluns (I/Port/Cable).

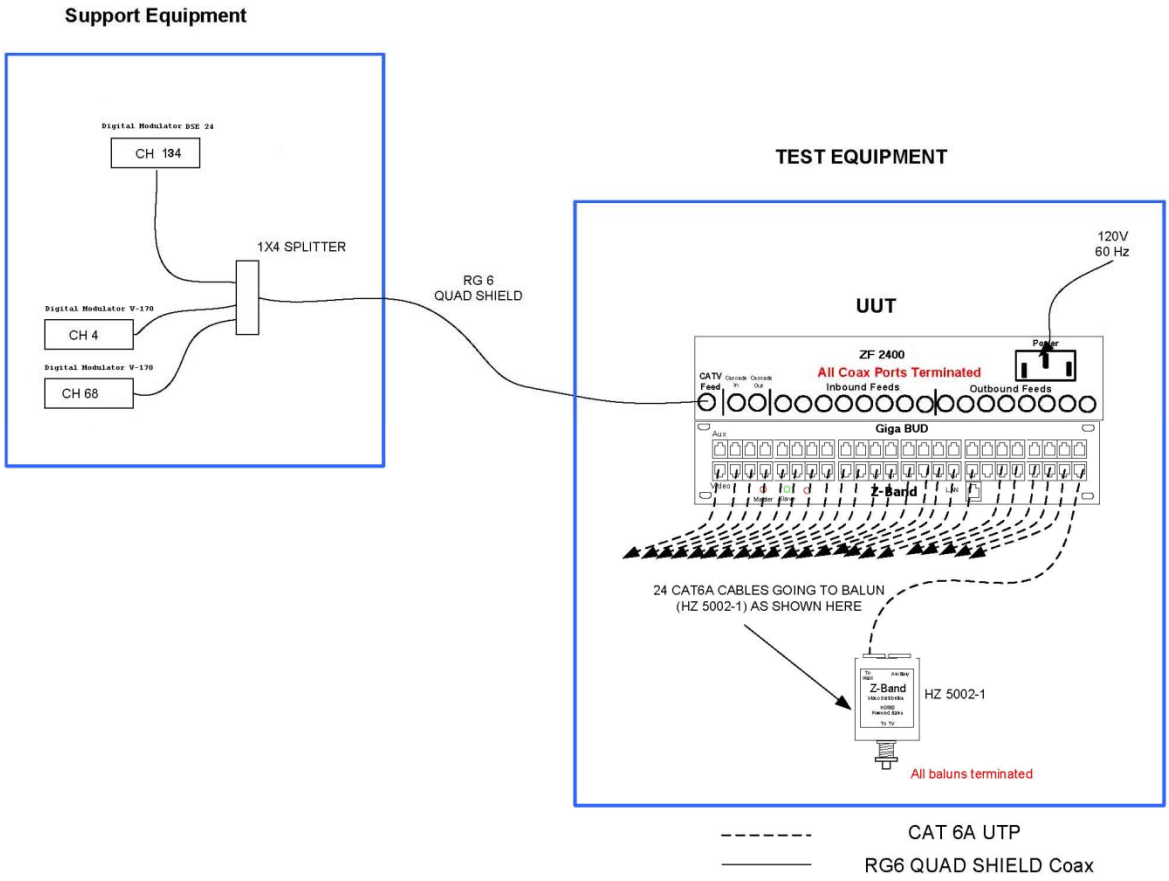
5.5.1 Support Equipment

All equipment that was utilized to achieve the EUT operating state specified in Paragraph 5.5 is listed in Table 5:

Table 5 - Support Equipment

Description	Manufacturer	Part Number	Model Number
Digital Modulator	Drake	N/A	DSE 24
(2) Digital Modulator	Zee Vee	N/A	ZV-170
(24) Balun	Z-Band	HZ-5002-1	N/A

Figure 1 - General Test Setup



6.0 Test Methods Performed

The following test methods were performed on the Broadband Video Distribution System, Part/Model Number: ZF-2400, Serial Number: 40099, in accordance with the requirements of ANSI C63.4 and FCC Rules and Regulation Part 15, Subpart B, and Industry Canada, ICES-003 Class A. All testing documented herein was performed in the sequence shown in Table 6.

Table 6 - Test Sequence and Results

Testing Dates	FCC Paragraph	IC Section	Test Method	Frequency Range	Results
May 20, 2013	15.107(b)	6.1	Conducted Emissions, Class A	150 kHz to 30 MHz	Complied
May 20, 2013	15.109(b)	6.2	Radiated Emissions, Class A	30 MHz to 1 GHz	Complied

See individual test methods contained in Paragraphs 6.1 and 6.2 of this test report for a full description of the test procedures utilized and the results obtained.

6.1 Conducted Emissions, 150 kHz to 30 MHz

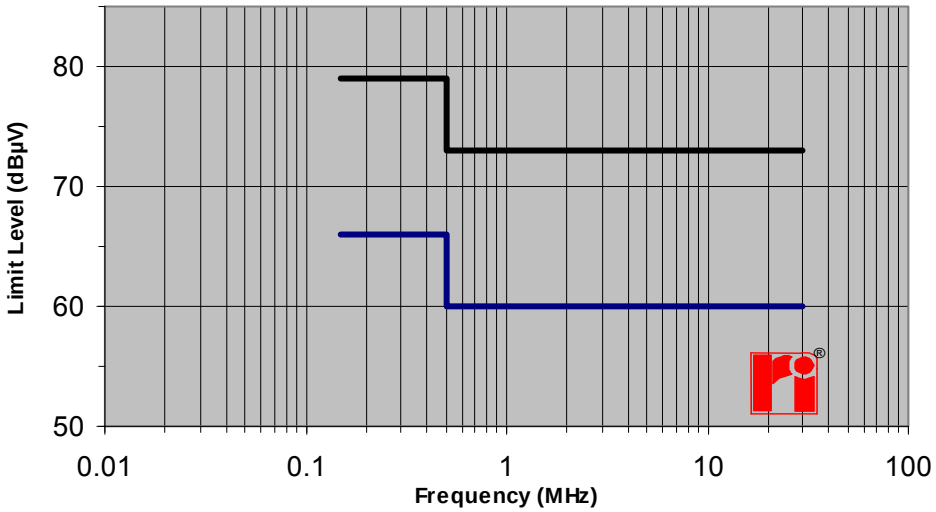
6.1.1 Purpose

The purpose of this test was to determine the magnitude of the radio frequency emissions emanating from the EUT via conduction on the AC power leads in the frequency range of 0.150 to 30 MHz.

6.1.2 Test Limits

The limits used to determine EUT compliance are shown in Figure 2 and were derived from FCC Part 15, Subpart B, Paragraph 15.107(b):

Figure 2 -Conducted Emissions, Test Limits



Frequency	Average Limit	Quasi-peak Limit
150 kHz	66 dBµV	79 dBµV
500 kHz	66 dBµV	79 dBµV
500 kHz	60 dBµV	73 dBµV
30 MHz	60 dBµV	73 dBµV

6.1.3 Leads Tested

The following leads of the EUT were tested during the course of this testing program in order to ensure compliance:

- 120 VAC, 60 Hz, Hot
- 120 VAC, 60 Hz, Neutral

6.1.4 Test Setup

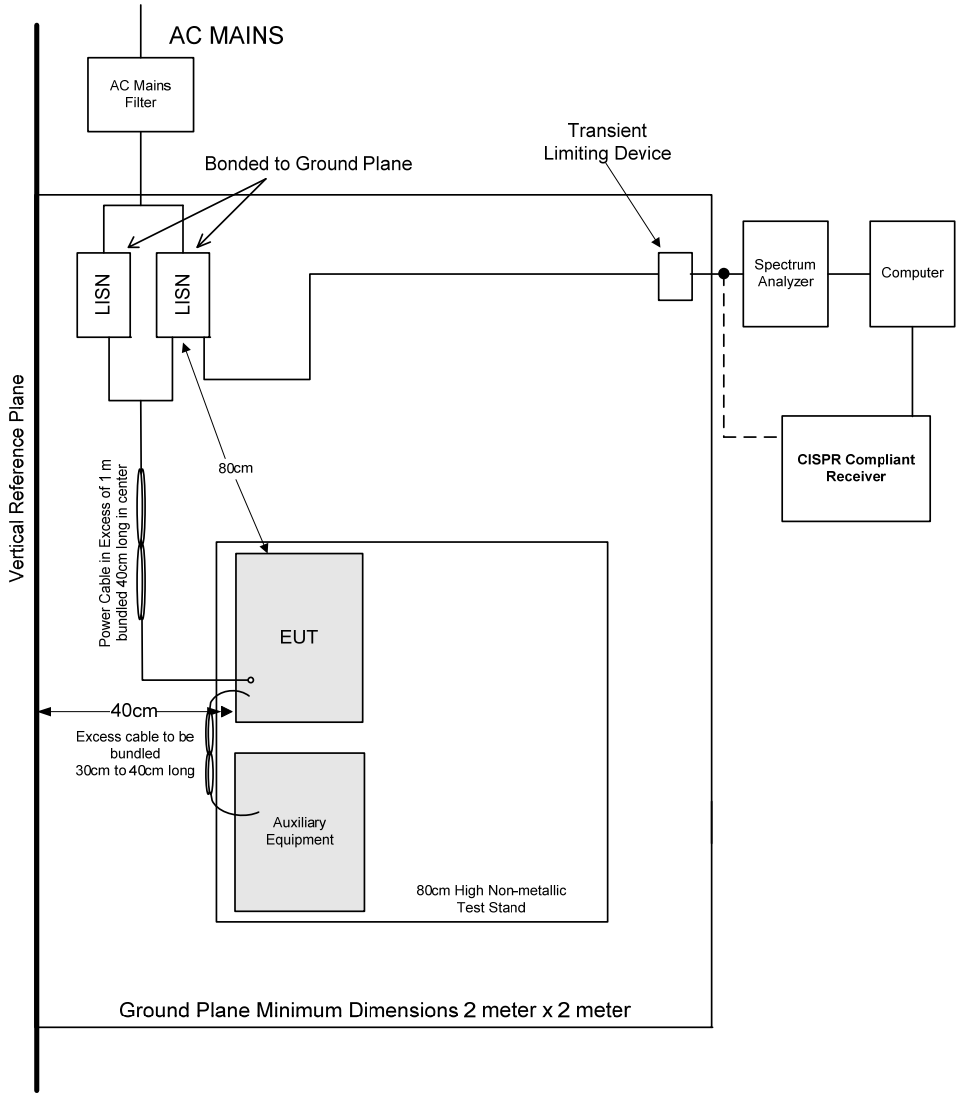
The EUT and associated cabling, configured as detailed in Paragraph 5.0 herein, was placed on a 0.8 m high non-conductive test stand above the horizontal ground plane. The horizontal ground plane extended at least 0.5 m beyond the boundary of the equipment under test, and had a minimum size of 2.0 m x 2.0 m. The 0.8 m test stand was positioned such that the distance between the EUT and the vertical reference plane was 0.4 m. All EUT components were located at least 0.8 m from all other metal surfaces. The ground plane was connected to the reference earth terminal of the LISN (V-network) with a conductor as short as possible. The LISN was located so that its closest surface was no less than 0.8 m from the nearest boundary of the equipment under test.

Each current carrying conductor of the EUT's power cord was then connected to a 50 ohm/50 µH LISN. The LISNs were mounted to the ground plane in a position that produced a minimum distance of 0.8 m between the EUT and the LISNs. Power cord length in excess of 1.0 m was folded to and forth to form a bundle in the approximate center of the cable not exceeding 0.4 m until the overall cable length was equal to 1.0 m. Earth connections, where required for safety purposes, were connected to the reference "earth" point of the LISN. Where not otherwise provided or specified by the manufacturer, they were 1 m long and run parallel to the mains connection at a distance of not more than 0.1 m.

The power and signal cables were oriented in relation to the ground plane in a manner equivalent to actual use. Excess lengths of interconnecting cables were bundled at the approximate center of the cable with bundles 30 to 40 cm in length, such that no cable was closer than 0.4 m to the horizontal ground plane.

The RF port of the LISN was connected to the test receiver by means of 50 Ohm coaxial cable through a transient limiting device. The RF ports of LISNs installed in power leads not under test were terminated in 50 Ohms.

Figure 3 - Conducted Emissions, Test Setup



6.1.5 Test Equipment

The details of the test equipment utilized during the performance of this test method are shown below:

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
713	ROHDE & SCHWARZ	EMI TEST RECEIVER	20 Hz - 26.5 GHz	ESIB26	6/8/2012	6/30/2013
8194	SOLAR ELECTRONICS	LINE IMPEDANCE STABILIZATION NETWORK	10 kHz - 30 MHz	8028-50-TS-24-B	1/14/2013	1/31/2014
8195	SOLAR ELECTRONICS	LINE IMPEDANCE STABILIZATION NETWORK	10 kHz - 30 MHz	8028-50-TS-24-B	1/14/2013	1/31/2014
8276	ELGAR	TRANSFORMER		2.5-13	No Calibration Required	
8496	NARDA	MED POWER ATTENUATOR	DC-11GHZ / 20W	768-10	6/4/2012	6/30/2013

6.1.6 Test Procedure

With the test instrumentation and the EUT configured as stated above, the following steps were performed in accordance with ANSI C63.4:

1. The EUT was operated as detailed in Paragraph 5.5 herein.
2. The measurement system was configured to measure the emissions on the first lead under test in the frequency range of 150 kHz to 30 MHz, utilizing a peak detector function.
3. The peak data obtained in Step 2 was then compared to the specified Quasi-Peak and average limits.
4. If the peak data obtained in Step 2 was found to be in compliance with the average limit, then this lead of the test sample was found to comply and the next lead under test was configured for testing beginning at step 2.
5. If the peak data obtained in Step 2 was found to be in compliance with the Quasi-Peak limit but not the average limit, the emissions exceeding the average limit were measured utilizing a CISPR compliant receiver with an average detector.
6. If the average data obtained in Step 5 complied with the average limit then this lead of the test sample was found to comply and the next lead under test was configured for testing beginning at Step 2.
7. If the peak data obtained in Step 2 did not comply with the both specified Quasi-Peak and average limits the emissions exceeding the specified limits were measured utilizing a CISPR compliant receiver with both Quasi-Peak and average detectors.
8. The obtained Quasi-Peak data was then compared to the specified Quasi-Peak limit, and the average data was compared to the average limit. If the obtained data was found to be in compliance with specified limits, then this lead of the test sample was found to comply.
9. Steps 1 through 8 were repeated for each remaining lead of the EUT.

6.1.7 Sample Calculations

Shown below is a sample showing calculations used, either manually or under software control, to derive the final corrected reading.

$R_C = M_R + C_{IL} + A_{IL}$

Where:
R_C = Corrected Reading in dBµV
M_R = Meter Reading in dBµV
C_{IL} = Insertion Loss of Cable in dB
A_{IL} = Insertion Loss of Attenuator in dB

Example:
Mr = 43.5 dBµV
C_{IL} = 0.15 dB
A_{IL} = 10.2 dB

R_C = 43.5 + 0.15 + 10.2 = 53.85 dBµV

6.1.8 Test Results

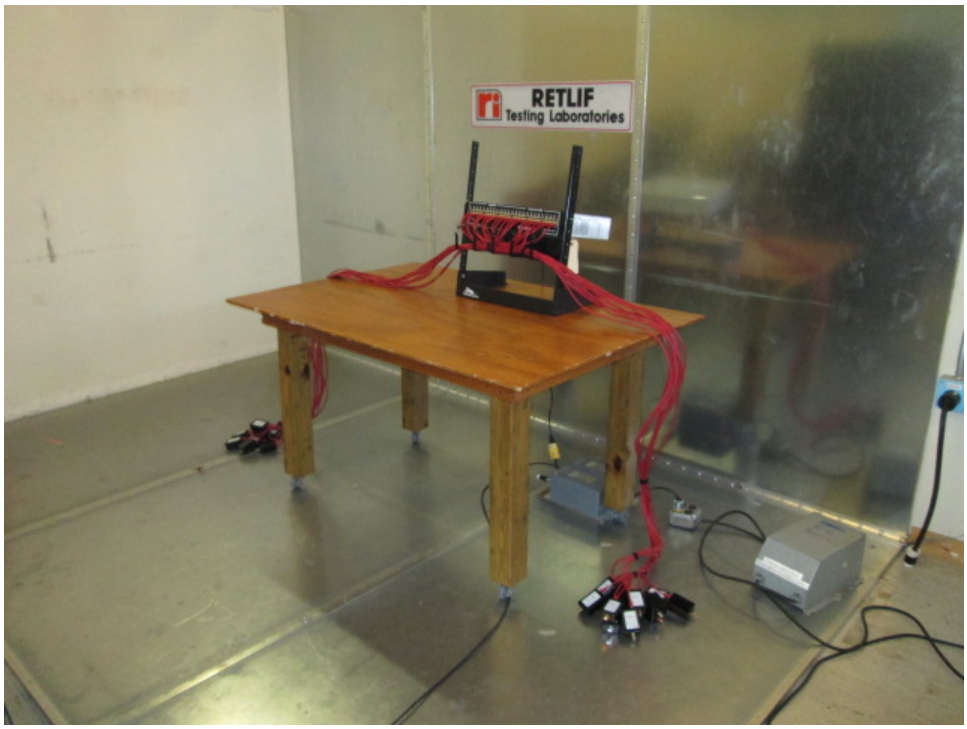
The EUT was found to comply with the requirements specified for this method. No emissions which exceeded the limits specified in Part 15, Subpart B or Industry Canada, ICES-003 for a Class A digital device, were observed.

See the following test photographs and test data for a full presentation of the results obtained.

Test Photographs
Conducted Emissions

Test Photographs
Conducted Emissions

EUT Configuration



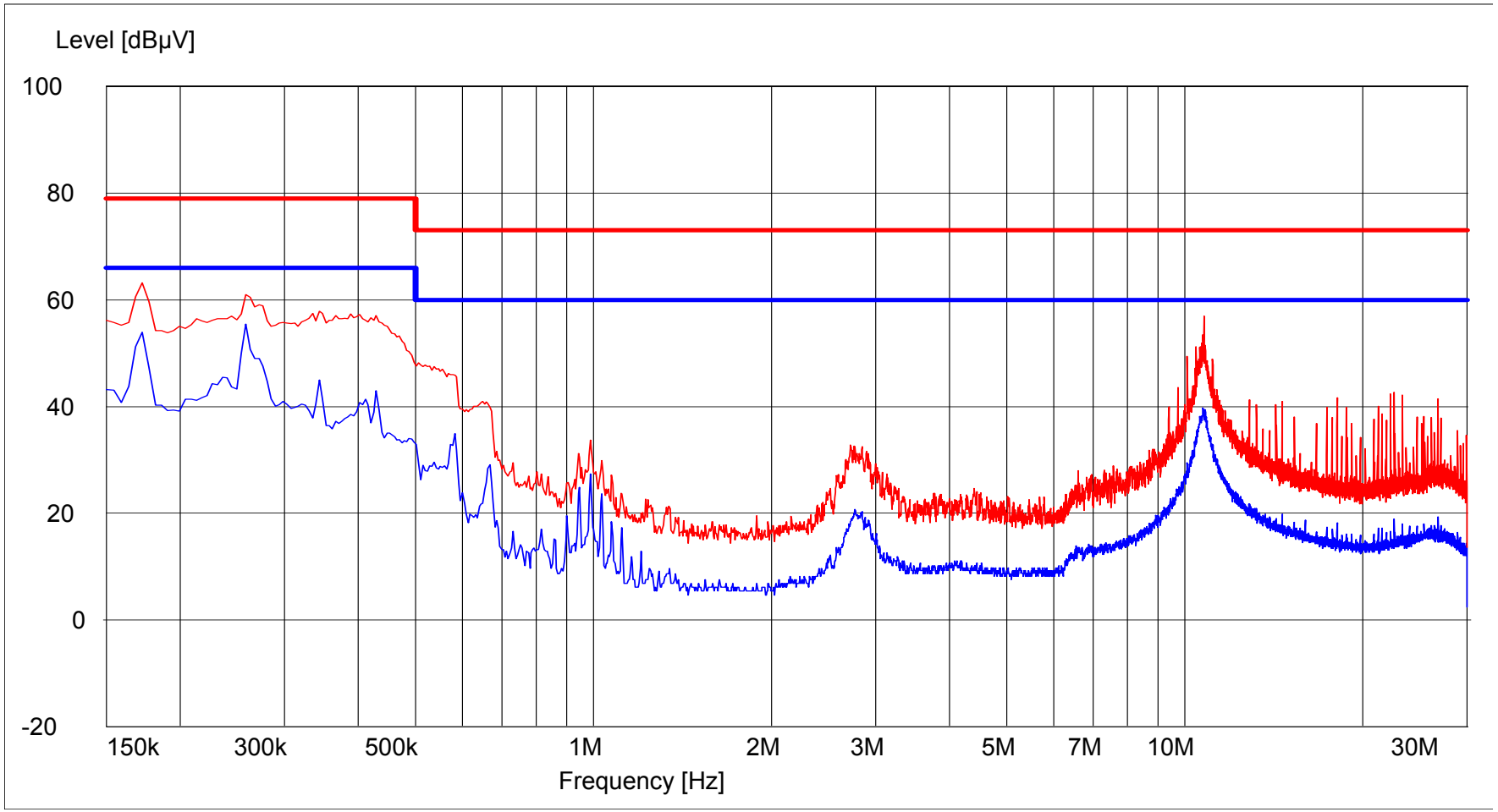
Test Setup

FCC Part 15, Subpart B, Class A, Conducted Emissions
Power Leads
150 kHz to 30 MHz
Test Data

Retlif Testing Laboratories, R-1578P

Conducted Emissions, 150 kHz to 30 MHz

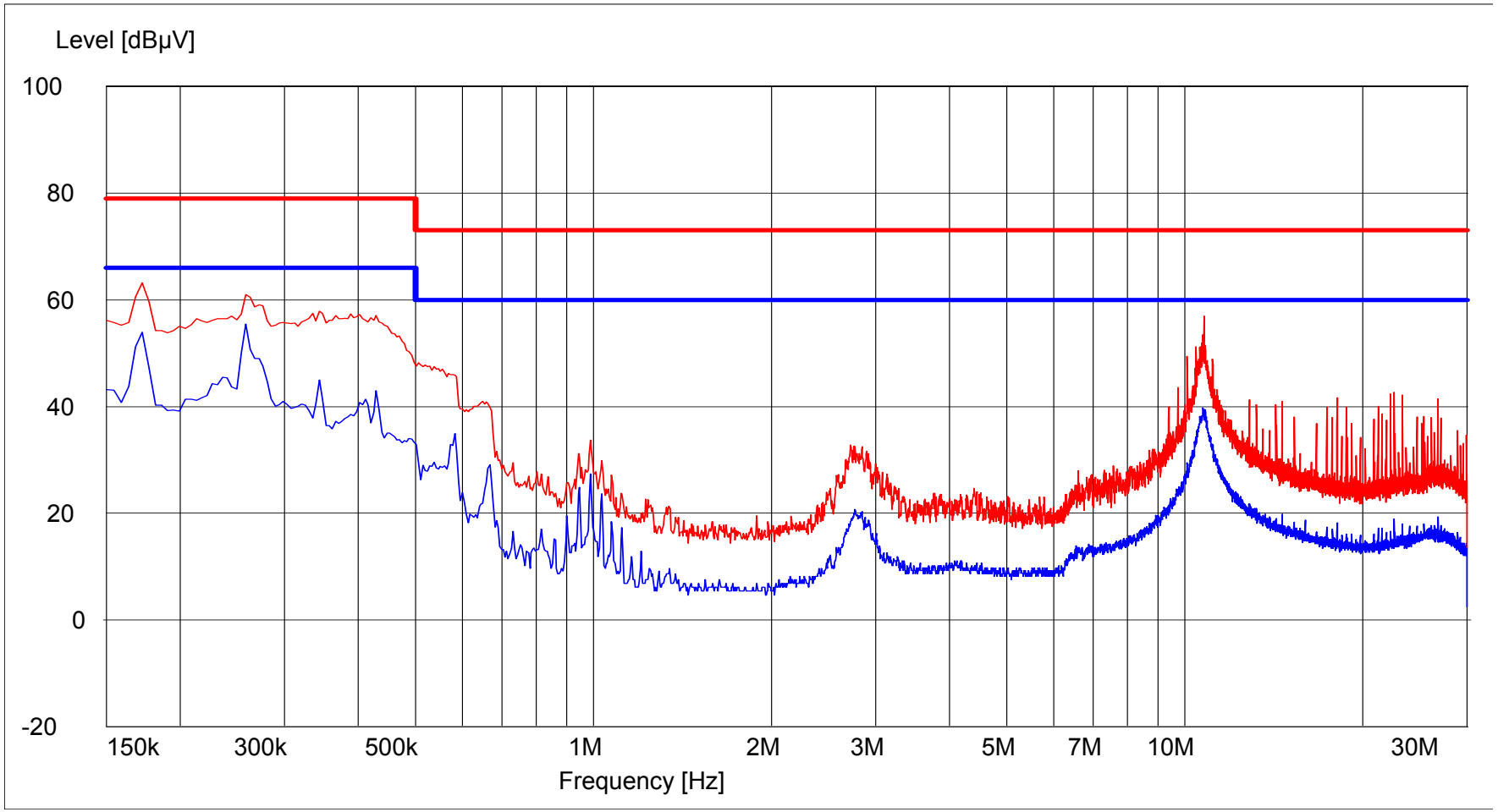
Customer:	Z-Band, Inc.
Test Sample:	Broadband Video Distribution System
Part/Model Number:	ZF-2400
Test Specification:	FCC Part 15 Subpart B
Mode of Operation:	Transmitting 3 Channel Frequencies
Technician/Date:	B. Reitz / 05/20/2013
Lead Tested:	115 VAC, 60 Hz, Hot



Retlif Testing Laboratories, R-1578P

Conducted Emissions, 150 kHz to 30 MHz

Customer:	Z-Band, Inc.
Test Sample:	Broadband Video Distribution System
Part/Model Number:	ZF-2400
Test Specification:	FCC Part 15 Subpart B
Mode of Operation:	Transmitting 3 Channel Frequencies
Technician/Date:	B. Reitz / 05/20/2013
Lead Tested:	115 VAC, 60 Hz, Neutral



6.2 Radiated Emissions, 30 MHz to 1 GHz

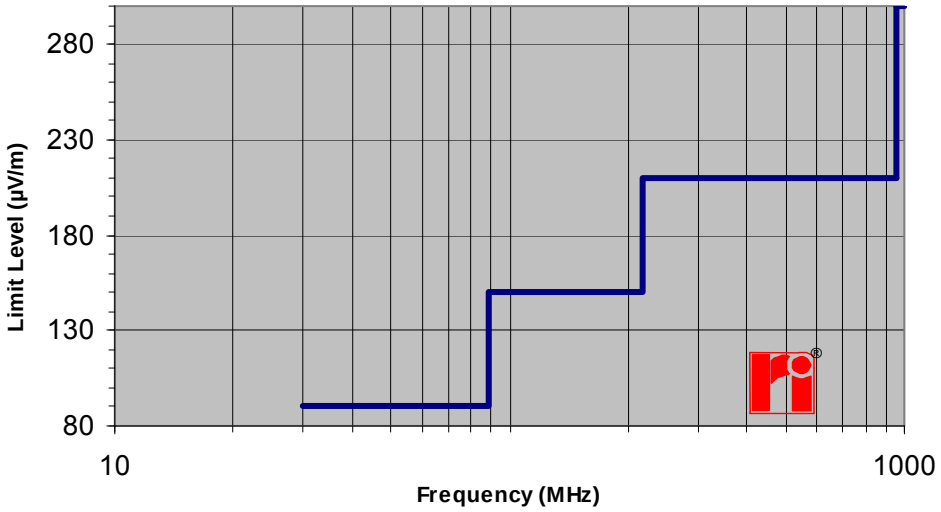
6.2.1 Purpose

The purpose of this test was to determine the magnitude of the radio frequency emissions emanating from the EUT via radiation from the enclosure and connected cabling in the frequency range of 30 MHz to 1 GHz.

6.2.2 Test Limit

The field strength of radiated emissions from a Class A digital device, as determined at a distance of 10 meters, did not exceed the limits shown in Figure 4. These limits were used to determine EUT compliance and were derived from FCC Part 15, Subpart B, Paragraph 15.109(b).

Figure 4 - Radiated Emissions, Test Limit



Frequency	Limit Level
30 MHz	90 µV/m
88 MHz	90 µV/m
88 MHz	150 µV/m
216 MHz	150 µV/m
216 MHz	210 µV/m
960 MHz	210 µV/m
960 MHz	300 µV/m
1 GHz	300 µV/m

6.2.3 Test Setup

The EUT and associated cabling, configured as detailed in Paragraph 5.0 herein was placed on a 0.8 m non-conductive test stand on the flush mounted turntable. The turntable positions were relative to the EUT as follows:

When facing the EUT the front is at 0^{o}, the rear is at 180^{o} and the left side is at 270^{o}. The test stand was situated such that the nearest part of the boundary of the EUT was located 10.0 m from the measuring antenna.

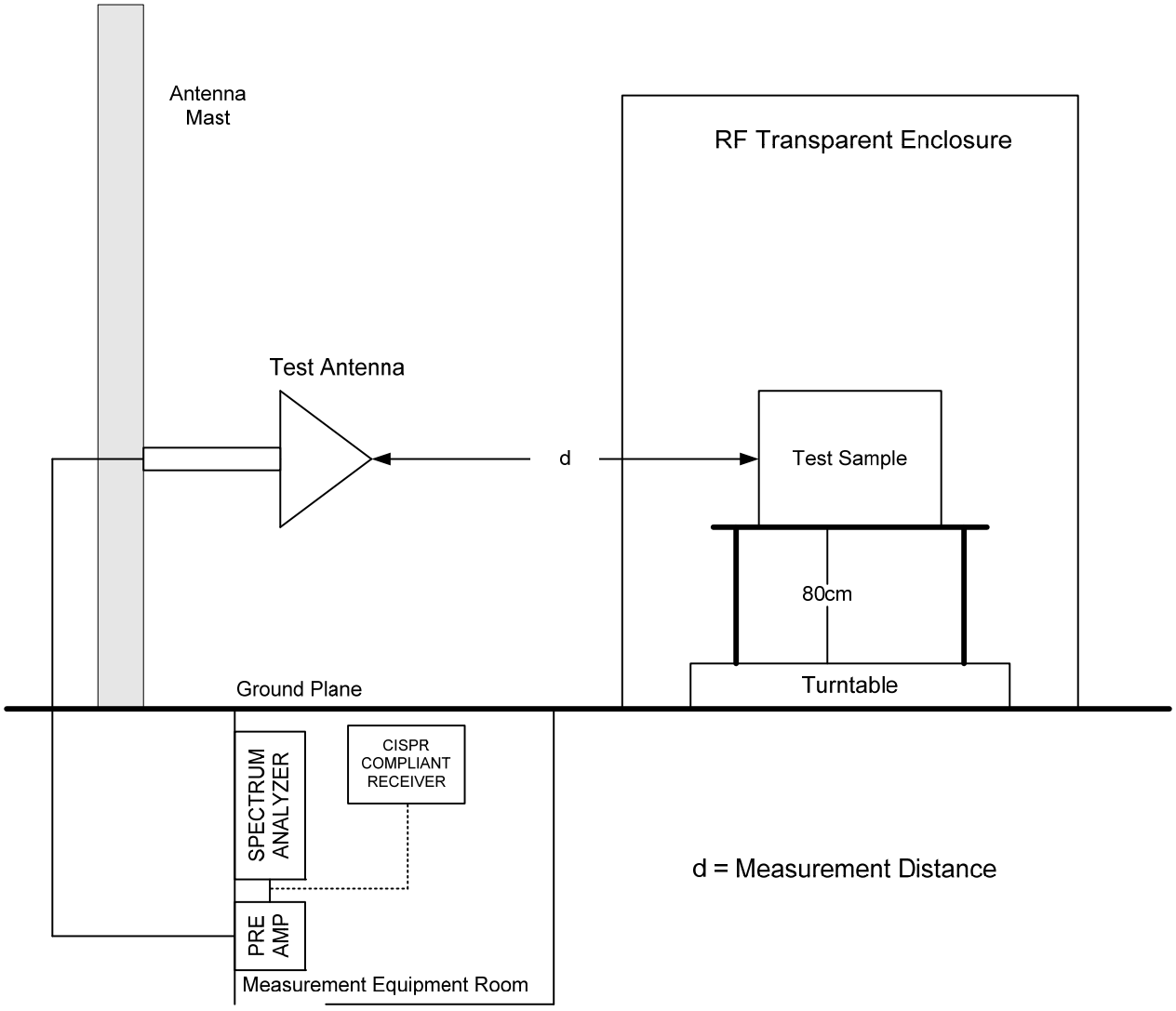
The AC power cables were routed to the AC mains outlet located on top of the turntable. Excess power cable length was left on the surface of the turntable. Earth connections, where required for safety purposes, were connected to a ground reference point on the turntable. Where not otherwise provided or specified by the manufacturer, they were 1.0 m long and run parallel to the mains connection at a distance of not more than 0.1 m.

Test Setup (con't.)

The power and signal cables were oriented in relation to the ground plane in a manner equivalent to actual use. Excess lengths of interconnecting cables were bundled at the approximate center of the cable with bundles 30 to 40 cm in length, such that no cable was closer than 0.4 m to the surface of the turntable. Care was taken during testing to relocate all system components and cabling in an effort to maximize the emissions from the EUT.

The antenna was connected via coaxial cable to a CISPR compliant receiver for final readings and to a broadband pre-amplifier, which in turn was connected to a spectrum analyzer in order to maximize emissions.

Figure 5 - Radiated Emissions, Test Setup



6.2.4 Test Equipment

The details of the test equipment utilized during the performance of this test method are shown below:

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
8076	AGILENT / HP	SPECTRUM ANALYZER	100 Hz - 1.5 GHz	8568B	8/7/2012	8/31/2013
8077	AGILENT / HP	SPECTRUM ANALYZER		85662A	8/7/2012	8/31/2013
8080	ROHDE & SCHWARZ	EMI TEST RECEIVER	20-1300 MHz	354-3000.56ESVP	5/9/2013	5/31/2014
8300C	UNKNOWN	3/10 METER CABLE	3/10 METER	3 METER CABLE	8/15/2012	8/31/2013
8411	SONOMA INSTRUMENT	PRE-AMPLIFIER	9 kHz - 1 GHz	310N	8/9/2012	8/31/2013
8433	ETS LINDGREN	BICONILOG	20 - 6000 MHz	3142D	8/2/2012	2/28/2014

6.2.5 Test Procedure

With the test instrumentation and the EUT configured as stated above, the following steps were performed in accordance with ANSI C63.4:

1. The EUT was operated as detailed in Paragraph 5.5 herein.
2. The spectrum analyzer was configured to display the frequency range of test.
3. With the test antenna both horizontally and vertically polarized, the EUT cabling was relocated in order to maximize the radiated emissions.
4. The operating mode of the EUT was varied in order to determine the operating mode which produced maximum radiated emissions with respect to the limit.
5. The EUT configuration which produced maximum radiated emissions with respect to the limit was maintained for the duration of testing.
6. The frequency of test was scanned to determine the frequency of all emissions from the EUT.
7. At each frequency upon which an emission was determined to be from the EUT the following steps were performed in order to further maximize the observed emissions:

a. The test antenna height was varied from 1.0 m to 4.0 m.
b. The test antenna polarization was varied from vertical to horizontal.
c. The EUT was rotated 360° about its vertical axis.

8. The RF cable from the test antenna was connected to the CISPR compliant receiver.
9. For all emissions found to be within 20 dB of the specified limit, the following was recorded:
    a. Frequency of emission.
    b. Quasi-Peak detector receiver meter reading.
    c. Correction factor consisting of antenna factor and cable loss.
    d. Test antenna height and polarization.
    e. Turntable position.

6.2.6 Sample Calculations

Shown below is a sample showing calculations used, either manually or under software control, to derive the final corrected reading.

$R_C = M_R + C_{IL} + A_F - G_P$

Where:
R_C = Corrected Reading in dBµV/M
M_R = Meter Reading in dBµV
C_{IL} = Insertion Loss of Cable in dB
A_F = Antenna Factor in dB
G_P = Gain of Pre-Amplifier in dB

Example:
M_R = 25.3 dBµV
C_{IL} = 3.6 dB
A_F = 12.4dB
G_P = 20.5 dB

R_C = 25.3 + 3.6 + 12.4 – 20.5 = 20.8 dBµV/M

6.2.7 Test Results

The EUT was found to comply with the requirements specified for this method. No emissions which exceeded the limits specified in Part 15, Subpart B or Industry Canada, ICES-003 for a Class A digital device were observed.

See the following test photographs and test data for a full presentation of the results obtained.

Test Photographs
Radiated Emissions

Test Photographs
Radiated Emissions

EUT Configuration

Test Photographs
Radiated Emissions

Horizontal Antenna Polarization

Vertical Antenna Polarization

FCC Part 15, Subpart B, Class A Radiated Emissions, 30 MHz to 1 GHz
Paragraph 15.109(b)
Test Data

Test Method:	**FCC Part 15, Subpart B, Class A Radiated Emissions, 30 MHz to 1 GHz, Paragraph 15.109(b)**		
Customer:	Z-Band, Inc	**Job No.:**	R-1985P
Test Sample:	Broadband video Distribution System		
Part/Model No.:	ZF-2400	**Serial No.:**	40099
Operating Mode:	Transmitting 3 Channel Frequencies		
Technician:	B. Reitz	**Date:**	5/20/13

Notes: All readings extrapolated to 10 M via 1/D
Test Distance: 3 Meters Temp: 20°C Relative Humidity: 57%
Detector Function: Quasi-Peak below 1 GHz

Frequency	Antenna Position	EUT Orientation	Meter Reading	Correction Factor	Corrected Reading	10 Meter Equivalent	Converted Reading	10 M Limit
MHz	(V/H) / Meters	Degrees	dBuV	dB	dBuV/m	dBuV	uV/m	uV/m
30								90
								|
67.378	V/ 1.18	213.6	16.8	9.18	25.98	15.53	5.98	|
67.378	H/ 3.00	131.7	18.6	9.18	27.78	17.33	7.35	|
								|
								|
88								90
88								150
								|
216								150
216								210
								|
349.306	V/ 1.47	181.5	16.2	19.21	35.41	24.96	17.70	|
349.306	H/ 1.18	312.8	15.8	19.21	35.01	24.56	16.9	150
								210
353.213	V/ 1.00	272.7	14.2	19.21	33.41	22.96	14.06	|
353.213	H/ 1.00	259.1	19.3	19.21	38.51	28.06	25.29	|
								|
								|
487.023	V/ 1.40	170.5	20.5	22.98	43.48	33.03	44.82	|
487.023	H/ 2.25	217.9	12.4	22.98	35.38	24.93	17.64	|
								|
800.897	V/ 1.63	244.7	17.6	28.84	46.44	35.99	63.02	|
800.897	H/ 1.17	140.2	21.0	28.84	49.84	39.39	93.22	|
								|
								|
853.904	V/ 2.72	200.6	20.4	28.75	49.15	38.7	86.1	|
853.904	H/ 1.59	148.1	23.5	28.75	52.25	41.8	123.03	|
								|
960								210
960								300
								|
								|
1,000								300
	The frequency range was scanned from 30 MHz to 1 GHz.							
	The emissions observed from the EUT do not exceed the specified limits.							
	Emissions not recorded were more than 20dB under the specified limit.							

Appendix A: FCC Rules, Verification

Appendix A

Sec. 2.902 Verification.

(a) Verification is a procedure where the manufacturer makes measurements or takes the necessary steps to insure that the equipment complies with the appropriate technical standards. Submittal of a sample unit or representative data to the Commission demonstrating compliance is not required unless specifically requested by the Commission pursuant to Sec. 2.957, of this part.

(b) Verification attaches to all items subsequently marketed by the manufacturer or importer which is identical as defined in Sec. 2.908 to the sample tested and found acceptable by the manufacturer.

Sec. 2.908 Identical defined.

As used in this subpart, the term identical means identical within the variation that can be expected to arise as a result of quantity production techniques.

Sec. 2.909 Responsible Party

The following parties are responsible for the compliance of radio frequency equipment with the applicable standards:

(b) In the case of equipment subject to authorization under the verification procedure, the manufacturer or, in the case of imported equipment, the importer. If subsequent to manufacture and importation, the radio frequency equipment is modified by any party not working under the authority of the responsible party, the party performing the modification becomes the new responsible party.

(d) If, because of modifications performed subsequent to authorization, a new party becomes responsible for ensuring that a product complies with the technical standards and the new party does not obtain a new equipment authorization, the equipment shall be labeled, following the specifications in Sec. 2.925(d), with the following:

This product has been modified by [insert name, address and telephone number of the party performing the modifications].

Appendix A (continued)

Sec. 2.952 Limitation on verification.

(a) Verification signifies that the manufacturer or importer has determined that the equipment has been shown to be capable of compliance with the applicable technical standards if no unauthorized change is made in the equipment and if the equipment is properly maintained and operated. Compliance with these standards shall not be construed to be a finding by the manufacturer or importer with respect to matters not encompassed by the Commission's rules.

(b) Verification of the equipment by the manufacturer or importer is effective until a termination date is otherwise established by the Commission.

(c) No person shall, in any advertising matter, brochure, etc., use or make reference to a verification in a deceptive or misleading manner or convey the impression that such verification reflects more than a determination by the manufacturer or importer that the device or product has been shown to be capable of compliance with the applicable technical standards of the Commission's rules.

Sec. 2.953 Responsibility for compliance.

(a) In verifying compliance, the responsible party, as defined in Sec. 2.909 warrants that each unit of equipment marketed under the verification procedure will be identical to the unit tested and found acceptable with the standards and that the records maintained by the responsible party continue to reflect the equipment being produced under such verification within the variation that can be expected due to quantity production and testing on a statistical basis.

(b) The importer of equipment subject to verification may upon receiving a written statement from the manufacturer that the equipment complies with the appropriate technical standards rely on the manufacturer or independent testing agency to verify compliance. The test records required by Sec. 2.955 however should be in the English language and made available to the Commission upon a reasonable request, in accordance with Sec. 2.956.

(c) In the case of transfer of control of equipment, as in the case of sale or merger of the grantee, the new manufacturer or importer shall bear the responsibility of continued compliance of the equipment.

(d) Verified equipment shall be reverified if any modification or change adversely affects the emanation characteristics of the modified equipment. The party designated in Sec. 2.909 bears responsibility for continued compliance of subsequently produced equipment.

Appendix B: FCC Rules, Retention of Records

Appendix B

Sec. 2.955 Retention of Records

(a) For each equipment subject to verification, the responsible party, as shown in Sec. 2.909 shall maintain the records listed as follows:

(1) A record of the original design drawings and specifications and all changes that have been made that may affect compliance with the requirements of Sec. 2.953.
(2) A record of the procedures used for production inspection and testing (if tests were performed) to insure the conformance required by Sec. 2.953. (Statistical production line emission testing is not required.)

(3) A record of the measurements made on an appropriate test site that demonstrates compliance with the applicable regulations in this chapter. The record shall:

(i) Indicate the actual date all testing was performed;
(ii) State the name of the test laboratory, company, or individual performing the verification testing. The Commission may request additional information regarding the test site, the test equipment or the qualifications of the company or individual performing the verification tests;
(iii) Contain a description of how the device was actually tested, identifying the measurement procedure and test equipment that was used;
(iv) Contains a description of the equipment under test (EUT) and support equipment connected to, or installed within, the EUT;
(v) Identify the EUT and support equipment by trade name and model number and if appropriate, by FCC Identifier and serial number;
(vi) Indicates the types and lengths of connecting cables used and how they were arranged or moved during testing;
(vii) Contain at least two drawings or photographs showing the test set-up for the highest line conducted emission and showing the test set-up for the highest radiated emission. These drawings or photographs must show enough detail to confirm other information contained in the test report. Any photographs used must be focused originals without glare or dark spots and must clearly show the test configuration used;

(viii) List all modifications, if any, made to the EUT by the testing company or individual to achieve compliance with the regulations in this chapter;

(ix) Include all of the data required to show compliance with the appropriate regulations in this chapter; and

(x) Contain, on the test report, the signature of the individual responsible for testing the product along with the name and signature of an official of the responsible party, as designated in Sec. 2.909.

(4) For equipment subject to the provisions in part 15 of this chapter, the records shall indicate if the equipment was verified pursuant to the transition provisions contained in Sec. 15.37 of this chapter.

(b) The records listed in paragraph (a) of this section shall be retained for two years after the manufacture of said equipment item has been permanently discontinued, or until the conclusion of an investigation or a proceeding if the manufacturer or importer is officially notified that an investigation or any other administrative proceeding involving his equipment has been instituted.

Appendix C: FCC Rules, Identification / Labeling

Appendix C; Labeling Requirements

Sec. 2.954 Identification

Each device marketed shall be uniquely identified by the person responsible for marketing or importing the equipment within the United States. However, the identification shall not be of a format which could be confused with the FCC Identifier required on certified, notified or type accepted equipment. The importer or manufacturer shall maintain adequate identification records to facilitate positive identification for each verified device.

1) A record of the original design drawings and specifications and all changes that have been made that may affect compliance with the requirements of paragraph 2.953
2) A record of procedures used for production inspection and testing to insure the conformance by paragraph 2.953.
3) A record of the measurements made on an appropriate test site that demonstrates compliance with the applicable regulations in this chapter. The record shall;
    - (i) Indicate the actual date all testing was performed;
    - (ii) State the name of the test laboratory, company, or individual performing the verification testing. The commission may request additional information regarding the test site, the test equipment or the qualifications of the company or individual performing the verification tests;
    - (iii) Contain a description of how the device was actually tested, identifying the measurement procedure and the test equipment that was used;
    - (iv) Contain a description of the equipment under test (EUT) and support equipment connected to, or installed within the EUT;
    - (v) Identify the EUT and support equipment by trade name and model number and, if appropriate, by FCC Identifier and serial number;
    - (vi) Indicate the type and lengths of connecting cables used and how they were arranged or moved during testing;
    - (vii) Contain at least two drawings or photographs showing the test set-up for the highest line conducted emission and showing the test set-up for the highest radiated emission. These drawings or photographs must show enough detail to confirm other information contained in the test report. Any photographs used must be focused originals without glare or dark spots and must clearly show the test configuration;
    - (viii) List all modifications, if any, made to the EUT by the testing company or individual to achieve compliance with the regulations in this chapter;

(ix) Include all of the data required to show compliance with the appropriate regulations in this chapter;

(x) Contain, on the test report, the signature of the individual responsible for testing the product along with the name and the signature of an official of the responsible party, as designated in paragraph 2.909.

4) For equipment subject to the provisions in Part 15 of this chapter, the records shall indicate if the equipment was verified pursuant to the transition provisions contained in paragraph 15.37 of this chapter.

(b) The records listed in paragraph (a) of this section shall be retained for two years after the manufacture of said equipment item has been permanently discontinued, or until the conclusion of an investigation or a proceeding if the manufacturer or importer is officially notified that an investigation or any other administrative proceeding involving his equipment has been instituted.

Sec. 15.19 Labeling Requirements

In addition to the requirements in FCC Part 2, a device subject to verification shall be labeled in accordance with FCC Part 15, Section 15.19 as follows:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference and
- This device must accept any interference received, including interference that may cause undesired operation.

Where a device is constructed in two or more sections connected by wires and marketed together, the statement specified above is required to be affixed only to the main control unit.

When the device is so small or for such use that it is not practicable to place the above statement on it, the information required shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC identifier or the unique identifier, as appropriate, must be displayed on the device.

Appendix D: FCC Rules, Information to User

Appendix D

Sec. 15.21 Information to User

The user's manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. In cases where the manual is provided only in a form other than paper, such as on a computer disk or over the Internet, the information required by this section may be included in the manual in that alternative form, provided the user can reasonably be expected to have the capability to access information in that form.

Sec. 15.105 Information to the user.

The following statement shall be provided to the text of the user's manual in a prominent location:

"This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense."

- For systems incorporating several digital devices, the statement shown above needs to be contained only in the instruction manual for the main control unit.

- In cases where the manual is provided only in a form other than paper, such as on a computer disk or over the Internet, the information required by this section may be included in the manual in that alternative form, provided the user can reasonably be expected to have the capability to access information in that form.

Appendix E: Canadian ICES-003, Test Report

Appendix E

ICES-003 Section 7 Test Report

A test report shall be compiled providing a record of the tests and results demonstrating compliance with the ICES-003 technical requirements. The test report shall indicate the date the tests were completed,

The test report shall clearly identify the Class of Limits, A or B, that the ITE was tested for compliance with, and shall clearly state which reference publication from Section 3 that was used for methods of measurement. The test report contents shall be in accordance with the reference publication used from Section 3.

The test report shall be retained by the manufacturer or imported for a minimum period of five years from the date the model of ITE is first offered for sale, distributed and/or leased in Canada, and shall be made available to Industry Canada upon request.

Appendix F: Canadian ICES-003, Labeling Requirements

Appendix F

ICES-003 Section 8 Labeling Requirements

The manufacturer, importer or supplier shall meet the labeling requirements set out in this section for every ITE unit[1]:

(i) Prior to marketing in Canada, for ITE manufactured in Canada, and;
(ii) Prior to importation into Canada, for imported ITE.

The presence of the label on the ITE represents the manufacturer's or importer's Self-Declaration of Compliance (SDoC) to Industry Canada ICE-003. Each unit of an ITE model shall bear a label indicating the model's compliance with ICES-003.

The label shall be permanently affixed to the ITE or displayed electronically and its text must be clearly legible. When the dimension of the device is too small or it is otherwise not practical to place the label on the ITE, the label shall be placed in a prominent location in the user manual supplied with the ITE. The user manual may be in an electronic format and must be readily available.

Industry Canada ICES-003 Compliance Label:

CAN ICES-3 (*)/NMB-3(*)

*Insert either "A" or "B" but not both to identify the applicable Class of ITE.

[1] The labeling requirements apply to new models. Existing models may continue with the requirements in Issue 4 or adopt the requirements in Issue 5.